Institute for Laboratory Automation

Realizing the Potential of Automation & Information Technologies in Science

Summary

The following write-up describes the work of the Institute for Laboratory Automation (ILA). Our purpose is to transform the practice of lab automation into a discipline that will:

- Result in well defined, designed, and successfully implemented projects that are supportable, and meet regulatory requirements
- Provide a basis for technology planning, management, and integration with the ability to take advantage of new products and technologies, and
- Address knowledge / information / data life-cycle planning and long-term management

The ILA will accomplish this by developing:

- The engineering discipline of Laboratory Automation Engineering (LAE), which looks at processes within the labs and how that work effects other groups / departments in an organization. This work will improve organizational efficiency by improving communications and information transfer between groups.
- An educational program for lab managers, system developers, scientists and technicians in the design, development, and use of lab automation and computing technologies. The management program builds a foundation of policies and models of lab operations. The development courses will look at designing systems that build on that foundation.
- Focused technology conferences on automation and computing technologies that will have a significant impact on how laboratories carry out their work.
- Standards programs [working with other organizations] for data management and interchange / communications.
- Services that will allow us to work with organizations to provide training, review lab automation programs, and provide limited advisory services, and
- Publications on laboratory automation and computing topics.

We are using this document to introduce ourselves, begin a discussion with you, and win your support. The Institute is a 501(c)3 non-profit organization located in Massachusetts. Additional information about our work can be found at: http://www.InstituteLabAuto.org

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Why is a new methodology needed?

The productivity of laboratories working in any field has become dependent upon computing / information technology and intelligent devices. That dependence is going to increase as:

- Organizations look for better returns on their investment in science
- Testing and analysis loads increase in both research and quality control / quality assurance
- Organizations work to extract more useful information from their laboratory data
- The sophistication of analytical techniques increases, and
- The need to meet legal & regulatory requirements becomes more acute

Vendors are offering products with increasing technological sophistication, with more software and intelligence built into equipment to make it easier to use, meet competitive pressures, and provide more capability. Information technology products are becoming more complex, with technologies such as virtualization having the potential for solving laboratory problems and increasing productivity, improving the quality of scientific work and reducing the cost.

The key to addressing the range of product offerings is to have a solid plan and model for laboratory operations. With that framework in place, vendor offerings and technologies can be evaluated and the need for customization determined with consideration for the impact of product life cycles. Process modeling of laboratory work is a unique and developing feature of our work.

Increasing product sophistication is not a guarantee of increased productivity. Without the planning noted above, the rate of return on those productivity gains will flatten. The ability to do that planning is part of the development of *Laboratory Automation Engineering* (LAE). Using the methodology developed for LAE will result in systems that:

- Work cooperatively with other groups / departments, thus improving organizational effectiveness
- Are supportable and easily updated so that they can take advantage of useful technology changes while still meeting regulatory compliance requirements
- Stress effective technology management, the impact of product life-cycles, and provide planning for data life-cycle management, and,
- Maintain the quality and integrity of the knowledge, information, and data resulting from research and quality control / quality assurance programs.

Laboratory Automation Engineering is one of the key programs of the **Institute for Laboratory Automation**.

Why is an engineering field needed?

Fields such as civil engineering, aeronautical and automotive engineering, electrical engineering, and chemical engineering began as small communities and didn't become what they are today until they became formal disciplines with structured methodologies. The same is true for computer science and engineering. What is now software engineering grew out of computer science departments with the development of organized course structures. We're at the same point in lab automation: we have communities, now it is time to build structure. That is what LAE is about.

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How is our work different from other organizations?

There are a number of groups - both formal organizations and informal on-line forums - that address topics and work in laboratory automation. In most cases, these groups focus on the science and instrumentation underlying automation systems.

The ILA is directing its efforts to a structured methodology for the design, development, integration, and management of information and automation technology used in laboratory systems. We will stress systems engineering, technology management, product and data life-cycle management, all of which will lead to more effective tools for lab work. In addition, we will address lab automation as part of an organizations overall information and technology management program.

ILA Proposed Projects Include:

__Lab Management__ needs to be educated in laboratory technology management & planning.

Those __working in labs__, need to learn how to use and apply lab automation & computing products.

__Developers__ need to learn how to develop systems that are robust, supportable, flexible, and not only meet customer needs, but anticipate growth and integration requirements.

- Technology development / training / demonstration center – a place where a laboratory can be put in place to show how automation tools work, try innovative approaches to doing lab work, and use the facility for training purposes. In the mid-1980s, Digital Equipment Corp. had a demonstration lab to show how networking, cooperative computer-robotics systems, laboratory office computing, and remote access to instruments could be done. It was very effective at conferences and became part of the in-house demonstration system.
- Summer Workshops (possible date in Q3 2010). Educating the laboratory community at all levels is needed. From those using the technologies in their work to those planning for its development and deployment, learning about the tools, techniques, and methodologies is essential. Our plan is to provide a continuing series of workshops on an annual basis for people to learn about laboratory automation and computing, including how to use and apply the technologies. These courses will be assembled according to a structure that reflects the principles behind Laboratory Automation Engineering (LAE) as well as providing fundamentals for laboratory users in both research and quality control.
- Building a knowledge-base system for lab automation & computing / LAE. The intent is to organize material on those subjects as an aid to learning and research. This could be based on wiki-type software, similar to wikipedia.com.
- Lights-out Lab Automation (LLA) – lab automation has been practiced as a step-wise implementation of products into a laboratory. To the best or our knowledge, no one has designed a laboratory with the needed automation and computing in place ready to function from day one. While our interests do not include denying people jobs, learning how to design and implement automation systems in the same way automated production systems are designed would benefit companies that depend on quality control and testing labs. We may not get to (or want to get to) the point where we design people-less labs, but the process of learning how to do so will improve our ability to approach more realistic situations.
- Building a formal educational program for Laboratory Automation Engineering.
- Technology Conference program – focused in-depth conferences on specific technologies designed to educate and discuss material from vendor, user, and regulatory viewpoints.

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Our History

While the "Institute for Laboratory Automation" name is new [November 2008], the non-profit has existed since 1991 when it was incorporated under the name "Laboratory Automation Standards Foundation (LASF)". Its primary purpose was to work with the Analytical Instrument Association in the development of the *andi* data interchange standards, which it did until 1997 when the work was transferred to ASTM International (formerly American Society for Testing and Materials). Over those six years, the organization carried out the following work in addition to working with the Analytical Instrument Association (now known as The Analytical and Life Science Systems Association):

- Developed and Presented Courses
    - LIMS – presented at company sites, including working with one company to guide them through the process of LIMS product requirements, & product evaluation; some of this work has been incorporated into the LAE material
    - *andi* standards, offered both as a public course from the LASF, and, at PITTCON
    - Strategic Approach to Laboratory Automation, based on the book "Laboratory & Scientific Computing:, J. Liscouski, LASF, published by John Wiley & Sons, 1994 [given at Scientific Computing &Automation Conference, PITTCON (several times), Worcester Polytechnical Institute as both a short course, and a one semester offering]
- Three Validation Symposia [1995, 1996, 1997] , the format used for these meetings will be the basis of our structure for the focused technology conferences noted above. At each of these meetings, presentations were made by vendors, users, and representatives from the U.S. Food & Drug Administration.
- Standards development for the Army Corps of Engineers, *andi* data interchange structure for ICP applications

The *andi* standards project was an effort initiated by the Analytical Instruments Association in 1991 to develop data interchange formats for analytical instrumentation. The AIA is now called the Analytical and Life Science Systems Association (ALSSA).

In 2005, Delphinus began work on the ideas behind Laboratory Automation Engineering. That material, listed below, is being transferred to the ILA:

- **Where Technology Management Meets Laboratory Management**, J. Liscouski, Lab Manager Magazine E-Newsletter, http://www.labmanager.com/articles.asp?ID=113
- **Technology Management: Product Life Cycle**, J. Liscouski, Lab Manager Magazine, July/August 2008, Vol 3 No 2, pgs 20-23
- **Outsourcing Laboratory Work—Establishing the Necessary Policies and Practices**, J. Liscouski, BioPharm International - Outsourcing Supplement, April 2008
- **Managements Role in Laboratory Automation**, J. Liscouski, Laboratory Manager Magazine, January 2008
- **Manager's Survival Guide to Engineering Laboratory Automation**, published by Delphinus, Inc. 2007
- **Lab automation engineering: The next, necessary field of study**, Joe Liscouski, Mass High Tech, Dec. 22-28, 2006, Vol 24 issue 52, page 11

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- **Are You a Laboratory Automation Engineer?**, Guest Editorial, Journal of the Association of Laboratory Automation, June 2006, Vol. 11, No. 3, pg 157

- The course "**Manager's Guide to Lab Automation & Technology Management**" – given by Delphinus [Sept 30 to Oct 2, 2008]

Recently (December 2008) a peer-reviewed paper by Neil Benn (Ziath Ltd) and Joe Liscouski (ILA) titled "Discussion of Open Source Methodologies in Laboratory Automation" has been accepted for publication in the Journal of the Association for Laboratory Automation (Spring 2009).

We Are Looking For Support for The Work We've Described

The Institute is a 501(c)3 non-profit organization*. Funding is essential to get these programs moving. The "Manager's Guide to Lab Automation & Technology Management" course is being updated with newly developed material. We expect to be updating the "Manager's Survival Guide to Engineering Laboratory Automation" in 2009. Among the items we're considering is the on-line delivery of course material.

We are looking for support in two forms:

- Letters of support – these will be used to demonstrate the industries interest in what we are doing as we work with other organization, and, seek funding
- Funding – we are looking for funding at three levels (sponsors will be prominently noted on our web site and in promotional materials):

    - Gold - $5,000: 1 person attends ILA courses or conferences in a 1 year period free of charge (does not include courses given through other organizations)
    - Silver - $2,500: 1 person attends ILA courses or conferences in a 1 year period at a 50% discount (does not include courses given through other organizations)
    - Bronze - $1,000: 1 person attends ILA courses or conferences in a 1 year period at a 25% discount (does not include courses given through other organizations)

Additional considerations may be extended as projects move from the proposal to planning and development stages.

The work we are doing will benefit both the scientific community and the vendors of products they use. Our goal is to improve the practice of laboratory automation and computing, advancing scientific work with better tools, systems, and products, and working in collaboration with those that use them.

If you are interested in providing letters of support or funding, they can be sent to: Institute for Laboratory Automation, 40 Paquawket Path, Groton MA 01450. We can accept checks and will shortly accept credit cards. When credit card payments are accepted, they will be done through the web address: http://www.institutelabauto.org/company/sponsorships.htm

*The Institute for Laboratory Automation (Groton, MA) is a non-profit 501(c)3 registered in the Commonwealth of Massachusetts. Note: We received our 501(c)3 letter of determination from the IRS on June 28 1993. A letter from the IRS dated April 24 2009 reconfirmed our status as a 501(c)3 organization.

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